hottest temperature heater head 1, 2, 3 and 4 to a predetermined target temperature. Valves **12669**, in this case servo-operated pinch valves, although other types of valves could be used as well, are opened between an air source, for example blower B or another additional blower, and the heater chambers **12618** to allow the flow of cooling gas/air to the hottest of the heater heads **12603**. As the certain heater head **12603** and/or heater chamber **12618** temperatures approaches a desired average temperature, the flow of cool gas/air is reduced by closing the valves **12669**.

[0627] The servo-operated pinch valves **12669** in this example, are controlled by the flow controller FC for positioning of each servo between the full-open and full-closed valve state. With this control scheme in an exemplary trial, the following important observations were made:

- **[0628]** As diverting air is applied to a single head to reduce its average temperature, the average temperature of each of the remaining heads will increase in temperature by approximately ⅓ the reduction of the first head;
- **[0629]** The full effect of the diverting air has a response of approximately 2-3 minutes, however results are immediately apparent;
- **[0630]** Once temperatures reach the desired level, the amount of diverting air applied typically should be reduced to maintain a stable temperature reading.

[0631] FIG. **127** represents a snapshot of data collected in an initial trial of the control scheme and pinch valves **12669**. The total average head temperature increased by 43° C. from 893° C. to 936° C. while maintaining a maximum temperature of 980° C. Condition "B" represents the data collected while diverting air was applied but the fuel flow was unchanged. The end condition "C" was maintained with a total diverting mass flow of 1.45 g/s, or 15.4% of the total flow through the burner (7.9 g/s through the inlet of the burner for an exhaust oxygen level of ~7.3%). Fuel mass flow was increased from 0.303 g/s of Biodiesel to 0.324 g/s.

[0632] Data was recorded for points of increased engine speed and crankcase pressure (2000 rpm/600 psi, 2500/600, 3000/600, 2000/750, 2500/750, and 3000/750). For each set of conditions, the diverting air was changed to control all max head temperatures as close to 980 C as possible, thus bringing the overall average head temperature to a maximum. Note that as engine speed increases, it appeared to become increasingly difficult to cool a single very hot head (i.e. the temperature spread between the hottest/coolest head becomes larger, even with max diverting air applied).

[0633] FIG. **128** is a graphical representation of test results showing the beneficial effects of the above described restricting air apparatus and control scheme. The graph shows that for example when an appropriate diverting air flow was provided to at least heater head 2 (the hottest head), the average heater head 2 temperature fell from 962 C to 949 C. And while heater head 4 remained substantially the same, heater heads 1 and 3 raised their average temperatures from 829 C to 993 C and 860 C to 926 C. The net effect brings the heater heads into much closer temperature tolerances, max and avg. as seen in the graph, and thus greater engine efficiency and less likelihood of engine damaging from over-heating certain heater heads.

[0634] The effect of the diverting air on providing even head temperatures and the ability to possess individual head control in a single burner/four heater head engine has demonstrated significant success especially when compared to a four-burner/four heater head. With the above described restricting air apparatus and control scheme the additional hardware required for diverting air is much cheaper (stainless steel and silicone tubing and four valves for supplying non-combustible gas/air); and the required software controls are more or less the same. A single flame requires only one igniter, fuel injector, and flame detector (and allows for direct control of the fuel/air ratio), making it easier and cheaper to assemble.

[0635] The current results provide approximately a 60° C. reduction in temperature on a single head without exceeding much more than 25% of the total mass flow through the burner. The result will also raise the temperature of three cold heads by approximately 20° C., providing about 80° C. in difference from the burner/engine steady state. To provide this diverting air, the blower will of course consume additional energy and reduce the power out of the engine. However, the desired net result that the 10-40 watts required blower power will be on the order of 20% of the additional power that is then able to be produced by the engine with the greater efficiency.

[0636] While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

What is claimed is:

1. A drive mechanism for a machine comprising:

a rocking beam having a first end and a second end, wherein a rocker pivot substantially centered on the rocking beam between the first end and the second end;

at least one cylinder;

at least one piston, the piston housed within a respective cylinder whereby the piston is capable of substantially linearly reciprocating within the respective cylinder;

at least one coupling assembly having a proximal end and a distal end, the proximal end being connected to the piston and the distal end being connected to the second end of the rocking beam by an end pivot; and

a connecting rod having a connecting rod first end and a connecting rod second end, the connecting rod connected at the connecting rod first end to the second end of the rocking beam and the connecting rod second end connecting to a crankshaft to convert rotary motion of the rocking beam to rotary motion of the crankshaft.

2. The rocking beam drive mechanism as set forth in claim **1**, wherein the crankshaft is arranged radially adjacent the at least one piston.

3. The rocking beam drive mechanism as set forth in claim **1**, wherein the crankshaft is axially spaced from the at least one piston and the rocking beam is arranged axially between the at least one piston and the crankshaft.

4. The rocking beam drive mechanism as set forth in claim **1**, further comprising a lubricating fluid pump to provide lubricating fluid via fluid lines to the rocking beam drive mechanism wherein the crankshaft directly pumps the oil to the fluid lines.

5. The rocking beam drive mechanism as set forth in claim **1**, further comprising a piston rod having a first end connected to the at least one piston and a second end connected